

## CLAIMS

I Claim:

- 1 *huk*  
2 *B7*
1. An optoelectronic semiconductor package device, comprising:  
2 a semiconductor chip that includes an upper surface and a lower surface, wherein the  
3 upper surface includes a light sensitive cell and a conductive pad;  
4 an insulative housing that includes a first single-piece non-transparent insulative housing  
5 portion that contacts the lower surface and is spaced from the light sensitive cell and a second  
6 transparent insulative housing portion that contacts the first housing portion and the light  
7 sensitive cell; and  
8 a conductive trace that extends outside the insulative housing and is electrically  
9 connected to the pad inside the insulative housing.
- 1 2. The device of claim 1, wherein the first housing portion contacts four outer side  
2 surfaces of the chip.
- 1 *3/* 3. The device of claim 1, wherein the first housing portion is spaced from the upper  
2 surface.
- 1 4. The device of claim 1, wherein the second housing portion contacts the  
2 conductive trace.
- 1 *5/* 5. The device of claim 1, wherein the second housing portion is spaced from the  
2 lower surface.
- 1 *huk*  
2 *BF*
- 1 6. The device of claim 1, wherein the first housing portion includes a peripheral  
2 ledge, and the second housing portion is located within the peripheral ledge.
- 1 7. The device of claim 1, wherein the first housing portion is a transfer molded  
2 material, and the second housing portion is a cured polymeric material.

1            8.     The device of claim 1, wherein the conductive trace extends through a peripheral  
2     side surface of the first housing portion and contacts the second housing portion without  
3     extending through a surface of the second housing portion.

1            9.     The device of claim 1, wherein the device is devoid of an electrical conductor that  
2     extends through a surface of the second housing portion.

1            10.    The device of claim 1, wherein the device is devoid of wire bonds, TAB leads and  
2     solder joints.

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11. An optoelectronic semiconductor package device, comprising:  
a semiconductor chip that includes an upper surface, a lower surface and outer side surfaces between the upper and lower surfaces, wherein the upper surface includes a light sensitive cell and a conductive pad;  
an insulative housing that includes a first single-piece non-transparent insulative housing portion that contacts the lower surface and the side surfaces and is spaced from the upper surface and a second transparent insulative housing portion that contacts the first housing portion and the light sensitive cell and is spaced from the lower surface; and  
a conductive trace that extends outside the insulative housing and is electrically connected to the pad inside the insulative housing.

12. The device of claim 11, wherein the second housing portion includes first and second opposing surfaces, the first surface contacts the light sensitive cell and the conductive trace, and the second surface faces away from the chip and is exposed.

13. The device of claim 11, wherein the first housing portion includes a peripheral ledge, and the second housing portion is located within the peripheral ledge.

14. The device of claim 13, wherein the second housing portion is recessed relative to the peripheral ledge.

15. The device of claim 11, wherein the first housing portion is a transfer molded material, and the second single-piece housing portion is a cured polymeric material.

16. The device of claim 11, wherein the insulative housing consists of the first and second housing portions.

17. The device of claim 11, wherein the first housing portion is a transfer molded material that includes a peripheral ledge, and the second housing portion is a cured polymeric material that is located within the peripheral ledge and includes a first surface that contacts the

4 light sensitive cell and the conductive trace and a second surface opposite the first surface that  
5 faces away from the chip and is exposed.

1 ~~19.~~ The device of claim 11, wherein the device is devoid of an electrical conductor  
2 that extends through a surface of the second housing portion.

1           20.   The device of claim 11, wherein the device is devoid of wire bonds, TAB leads  
2   and solder joints.

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21. An optoelectronic semiconductor package device, comprising:  
 a semiconductor chip that includes an upper surface, a lower surface and four outer side  
 surfaces between the upper and lower surfaces, wherein the upper surface includes a light  
 sensitive cell and a conductive pad;  
 an insulative housing that includes a top surface, a bottom surface and peripheral side  
 surfaces between the top and bottom surfaces, wherein the insulative housing further includes  
 first and second insulative housing portions, the first housing portion is a single-piece that  
 provides the bottom surface and is non-transparent, and the second housing portion contacts the  
 upper surface, provides at least a portion of the top surface and is transparent; and  
 a conductive trace that extends outside the insulative housing and is electrically  
 connected to the pad inside the insulative housing.

22. The device of claim 21, wherein the first housing portion contacts the lower  
 surface and the outer side surfaces and is spaced from the upper surface.

23. The device of claim 21, wherein the second housing portion contacts the light  
 sensitive cell and the conductive trace and is spaced from the lower surface.

24. The device of claim 21, wherein the first housing portion includes a peripheral  
 ledge that forms a peripheral portion of the top surface, and the second housing portion is located  
 within and recessed relative to the peripheral ledge.

25. The device of claim 21, wherein the first housing portion is a transfer molded  
 material, and the second single-piece housing portion is a cured polymeric material.

26. The device of claim 21, wherein the insulative housing consists of the first and  
 second housing portions.

27. The device of claim 21, wherein the conductive trace and the light sensitive cell  
 contact a major surface of the second housing portion that faces towards and is parallel to the  
 upper surface.

1            28.    The device of claim 21, wherein the device is devoid of an electrical conductor  
2    that extends through the top or bottom surfaces.

1 ~~29. The device of claim 21, wherein the device is devoid of an electrical conductor~~  
2 ~~that extends through a surface of the second housing portion.~~

1           30.     The device of claim 21, wherein the device is devoid of wire bonds, TAB leads  
2     and solder joints.

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1 31. An optoelectronic semiconductor package device, comprising:  
2 a semiconductor chip that includes an upper surface, a lower surface and four outer side  
3 surfaces between the upper and lower surfaces, wherein the upper surface includes a light  
4 sensitive cell and a conductive pad;  
5 an insulative housing that includes a top surface, a bottom surface and peripheral side  
6 surfaces between the top and bottom surfaces, wherein the insulative housing further includes  
7 first and second insulative housing portions, the first housing portion is a single-piece that  
8 provides the bottom surface, the peripheral side surfaces and a peripheral portion of the top  
9 surface, contacts the lower surface and the outer side surfaces, is spaced from the light sensitive  
10 cell and is non-transparent, and the second housing portion is a single-piece or double-piece that  
11 provides a central portion of the top surface within the peripheral portion of the top surface,  
12 contacts the first housing portion, the light sensitive cell and the conductive trace, is spaced from  
13 the lower surface and is transparent; and  
14 a conductive trace that extends outside the insulative housing and is electrically  
15 connected to the pad inside the insulative housing.

1 32. The device of claim 31, wherein the second housing portion includes first and  
2 second opposing surfaces, the first surface faces towards the chip and contacts the light sensitive  
3 cell and the conductive trace, and the second surface faces away from the chip and provides the  
4 central portion of the top surface and is exposed.

1 33. The device of claim 31, wherein the peripheral portion of the top surface forms a  
2 rectangular peripheral ledge, and the second housing portion is located within and recessed  
3 relative to the peripheral ledge.

1 34. The device of claim 33, wherein the peripheral ledge includes four inner side  
2 surfaces that are opposite the peripheral side surfaces and outside a periphery of the chip.

1 35. The device of claim 31, wherein the first housing portion is a transfer molded  
2 material, and the second housing portion is a cured polymeric material.

1           36.    The device of claim 31, wherein the insulative housing consists of the first and  
2   second housing portions.

1 *rule*  
*B19* 37.    The device of claim 31, wherein the first housing portion is a transfer molded  
2   material that includes a peripheral ledge, and the second housing portion is a cured polymeric  
3   material that is located within the peripheral ledge and includes a first surface that faces towards  
4   the chip and contacts the light sensitive cell and the conductive trace and a second surface  
5   opposite the first surface that faces away from the chip and provides the central portion of the top  
6   surface and is exposed.

1           38.    The device of claim 31, wherein the device is devoid of an electrical conductor  
2   that extends through the top or bottom surfaces.

1 *rule*  
*B20* 39.    The device of claim 31, wherein the device is devoid of an electrical conductor  
2   that extends through a surface of the second housing portion.

1           40.    The device of claim 31, wherein the device is devoid of wire bonds, TAB leads  
2   and solder joints.



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1 / 42. The device of claim 41, wherein the first housing portion contacts the lower  
2 surface and four outer side surfaces of the chip.

1           43.     The device of claim 41, wherein the second housing portion contacts the light  
2     sensitive cell and the conductive trace.

1           44.     The device of claim 41, wherein the first housing portion includes a peripheral  
2     ledge, and the second housing portion is located within the peripheral ledge.

1 **322** 45. The device of claim 41, wherein the first housing portion is a transfer molded  
2 material, and the second single-piece housing portion is a cured polymeric material.

1           46.     The device of claim 41, wherein the insulative housing consists of the first and  
2     second housing portions.

1 47. The device of claim 41, wherein the conductive trace and the light sensitive cell  
2 contact a major surface of the second housing portion that faces towards and is parallel to the  
3 upper surface.

1           48.    The device of claim 41, wherein the device is devoid of an electrical conductor  
2   that extends through the top or bottom surfaces.

1 ~~7/16~~ ~~824~~ 49.    The device of claim 41, wherein the device is devoid of an electrical conductor  
2   that extends through a surface of the second housing portion.

1           50.    The device of claim 41, wherein the device is devoid of wire bonds, TAB leads  
2   and solder joints.

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1 51. An optoelectronic semiconductor package device, comprising:  
 2 a semiconductor chip that includes an upper surface and a lower surface, wherein the  
 3 upper surface includes a light sensitive cell and a conductive pad;  
 4 an insulative housing that includes a top surface, a bottom surface and a peripheral side  
 5 surface between the top and bottom surfaces, wherein the insulative housing further includes a  
 6 first single-piece housing portion that contacts the lower surface and is spaced from the light  
 7 sensitive cell and a second single-piece housing portion that contacts the first housing portion  
 8 and the conductive trace and is transparent, the first housing portion alone provides the bottom  
 9 surface, and the first and second housing portions in combination provide the top surface; and  
 10 a conductive trace that protrudes laterally from and extends through the side surface and  
 11 is electrically connected to the pad, wherein the conductive trace includes a recessed portion  
 12 inside the insulative housing that extends through the side surface and is spaced from the top and  
 13 bottom surfaces and a non-recessed portion outside the insulative housing that is adjacent to and  
 14 integral with the recessed portion and contacts the side surface and is adjacent to a corner  
 15 between the side surface and the top surface.

1 52. The device of claim 51, wherein the second housing portion includes first and  
 2 second opposing surfaces, the first surface contacts the light sensitive cell and the conductive  
 3 trace, and the second surface faces away from the chip and is exposed.

1 53. The device of claim 51, wherein the first housing portion includes a peripheral  
 2 ledge, and the second housing portion is located within and recessed relative to the peripheral  
 3 ledge.

1 54. The device of claim 53, wherein the peripheral ledge includes four inner side  
 2 surfaces that are opposite the peripheral side surfaces and outside a periphery of the chip.

1 55. The device of claim 51, wherein the first housing portion is a transfer molded  
 2 material, and the second housing portion is a cured polymeric material.

1           56.    The device of claim 51, wherein the insulative housing consists of the first and  
2   second housing portions.

1 *huk* *B26* 57.    The device of claim 51, wherein the first housing portion is a transfer molded  
2   material that includes a peripheral ledge, and the second housing portion is a polymeric material  
3   that is located within the peripheral ledge and includes a first surface that contacts the light  
4   sensitive cell and the conductive trace and a second surface opposite the first surface that faces  
5   away from the chip and is exposed.

1           58.    The device of claim 51, wherein the device is devoid of an electrical conductor  
2   that extends through the top or bottom surfaces.

1 *huk* *B27* 59.    The device of claim 51, wherein the device is devoid of an electrical conductor  
2   that extends through a surface of the second housing portion.

1           60.    The device of claim 51, wherein the device is devoid of wire bonds, TAB leads  
2   and solder joints.

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